Headquarters U.S. Air Force, Electronic Systems Center

Integrated Command and Control (IC2) System Program Office

Integrity - Service - Excellence

National Air and Space Model (NASM) Program Brief

ESC/CXC
15 Eglin St, Bldg 1607
Hanscom AFB, MA 01731-2100

U.S. AIR FORCE

11 Oct 02

U.S. AIR FORCE

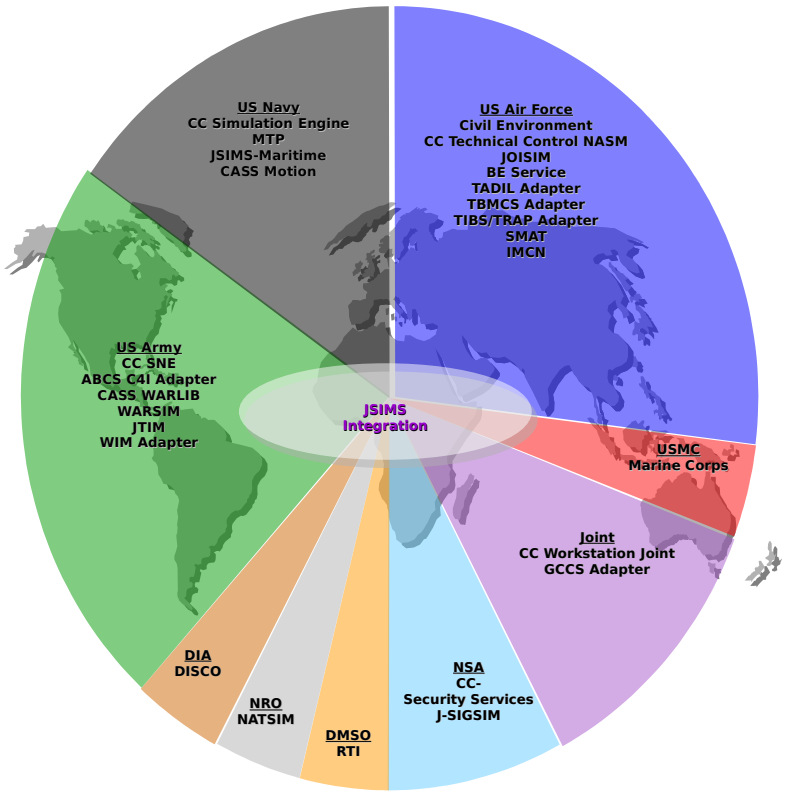
Purpose/Agenda

- **Purpose**
  - **To provide an information briefing on the NASM Program and transition from legacy systems**
- **Agenda**
  - **Vision**
  - **Requirements**
  - **Recent Successes: Civil Environment Model**
  - **Schedule**
  - **V1.0 Functionality/V2.0 Candidates**
  - **Test & Evaluation strategy**
  - **Fielding Plan**
  - **Strategy**
  - **Development Questions**

U.S. AIR FORCE

NASM Vision

JSIMS Partners & Components



JSIMS is the next generation simulation system for 21st Century Warfighter readiness. NASM satisfies JSIMS requirements as the Air & Space Component and supports a realistic joint battlespace environment for Joint, other service readiness. NASM provides transition from the legacy AWSIM/AFMSTT for AF-centric training and is leveragable to uses beyond training & readiness.

U.S. AIR FORCE

NASM Overarching Requirements

- ACAT 3 AF Program part of the ACAT 1D JSIMS program
- Build air & space (A&S) representations
  - A&S platforms, weapons, and organizations
  - Civil Environment (CE) representation for JSIMS partners
    - Provides strategic & cascading effects for effects-based operations
- Part of the JSIMS Alliance Team
  - Integrate & test software with all Alliance partners
  - Alliance funded to build assigned common components and products for JSIMS (e.g., Tech Control)
  - Air Staff direction is JSIMS support is first priority
- Deploy & maintain system to AF sites
  - C2 Technology Innovation Group, Hurlburt, FL
  - Warrior Preparation Center, Einsiedlerhof, GE
  - Korean Air Simulation Center, Osan AB, Korea

U.S. AIR FORCE

The Solution: NASM

Enhance Realism	Reduce Staffing	Extensible Architecture
• Support the entire range of AF roles & missions: ⇒ Strategic effects ⇒ Joint/coalition warfare ⇒ Information operations • Comprehensive environmental effects: ⇒ Terrain ⇒ Enemy • Training audience interface via TBMCS and other train as you fight systems	• Reduction of Role Players and Contractor support • Enhanced automated forces • System features: ⇒ Rapid scenario generation ⇒ Control of distributed exercises ⇒ Integrated After Action Review (AAR) and Evaluation	• Developed to standards: ⇒ High-level Architecture from the ground up ⇒ True Discrete event ⇒ JSIMS System Architecture • Leveragable to support context for DMT, course of action analysis, and higher fidelity lower echelon trainingning • Modeling supports high resolution interactions for: ⇒ Missions ⇒ Organizations

NASM closely replicates the joint battlespace to effectively portray air & space power

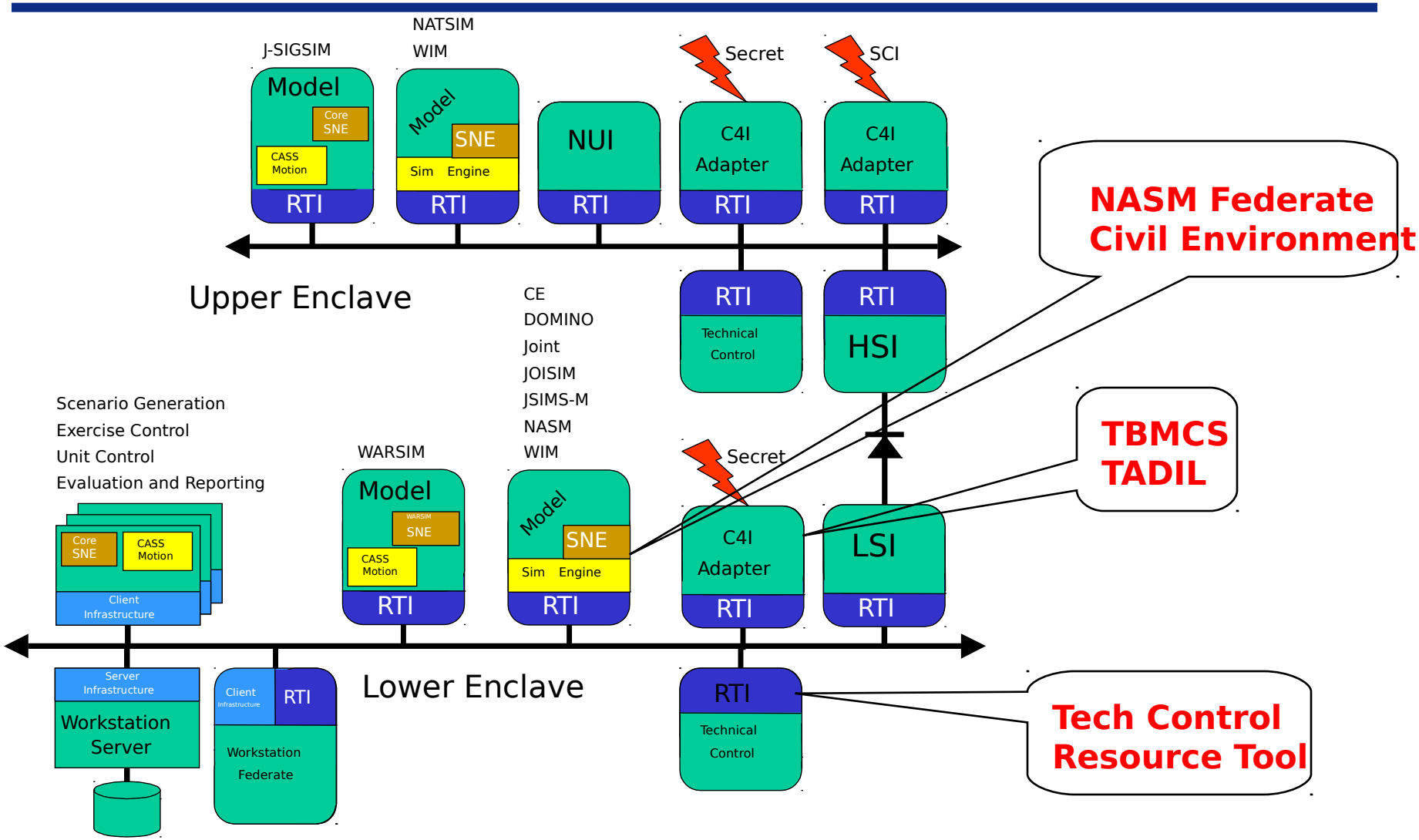
U.S. AIR FORCE

NASM/JSIMS Major System Improvements

AWSIM/AFMSTT/ Joint Training Confederation (JTC)	NASM/JSIMS
Multiple Databases AWSIM LogSIM CBS TACSIM	Single Database
Disparate/Differing Views of the Battlespace	Single Consistent View of Battlespace
Bald Earth	Digitized (Dynamic) Terrain from NIMA Sources
No Standardized AAR	Single Integrated "Continuous" Review
AWSIM-TBMCS Interface	Expanded AOC-Simulation automation
Hard Coded Unit Behaviors	Loadable Behaviors (allows User to change unit behaviors without changing model, data driven)
Fixed resolution	Dynamic multi-resolution models
Attrition & Force-on-force Warfare	Strategic Effects

U.S. AIR FORCE

JSIMS Architecture NASM Piece Parts



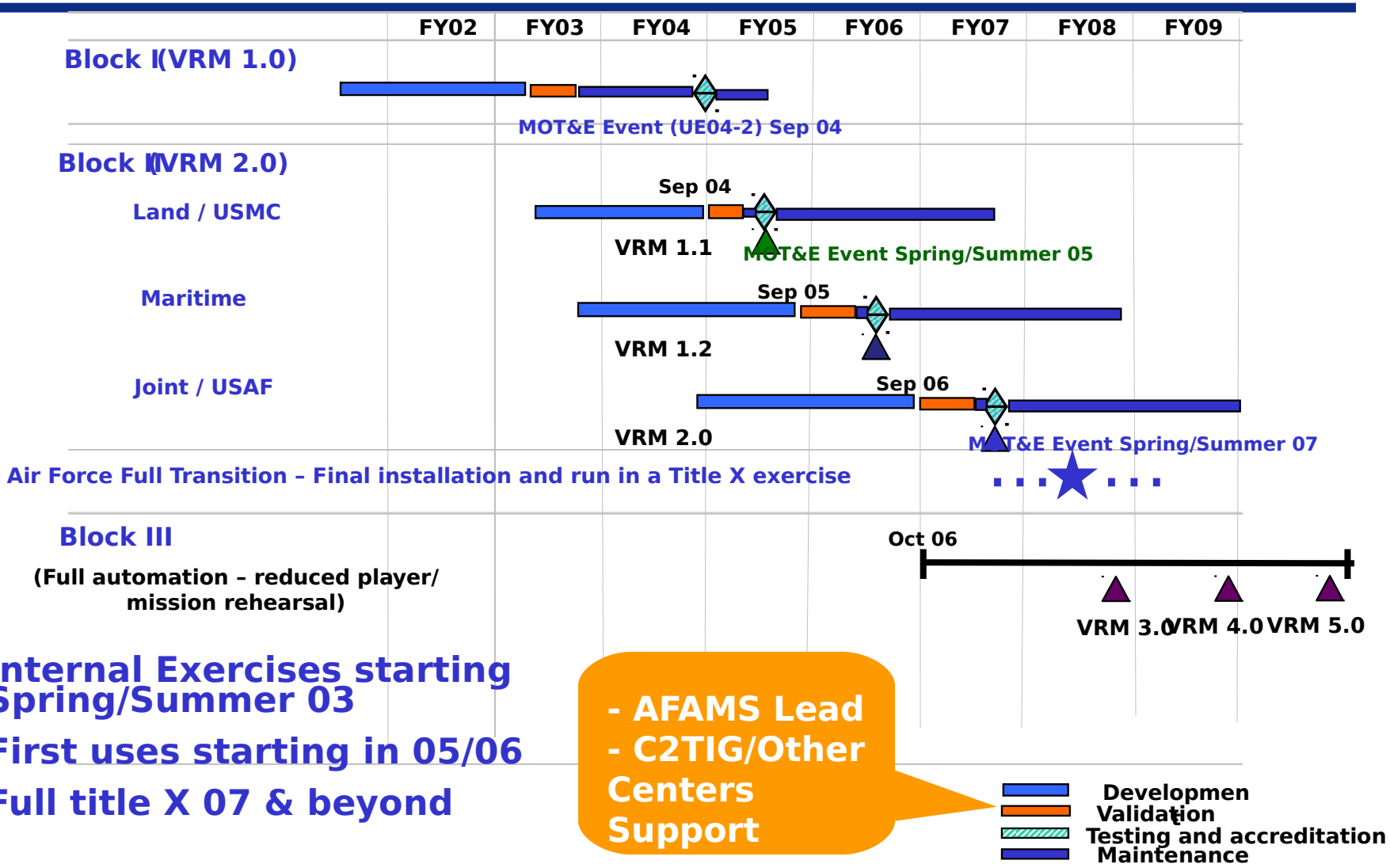
U.S. AIR FORCE

Recent Successes:
CE Model
Fielded and used for training Today

- Global Engagement V – June 2000
  - High level model of future capabilities
- NASM / WARSIM Demonstration – Nov 2000
  - CE interfaced with JSIMS and Basic Capabilities
- Union Flash (May 01); Enable Freedom (May 02)
  - European (Warrior Preparation Center) Exercises
  - CE reported Cascading Effects of air strikes
- Millennium Challenge 02
  - Joint Forces Command Exercises
  - CE reported Cascading Effects of various strikes
- Revised strategy to move CE behind the green door to show value & make more intuitive

JSIMS Schedule for VRM 2.0

U.S. AIR FORCE



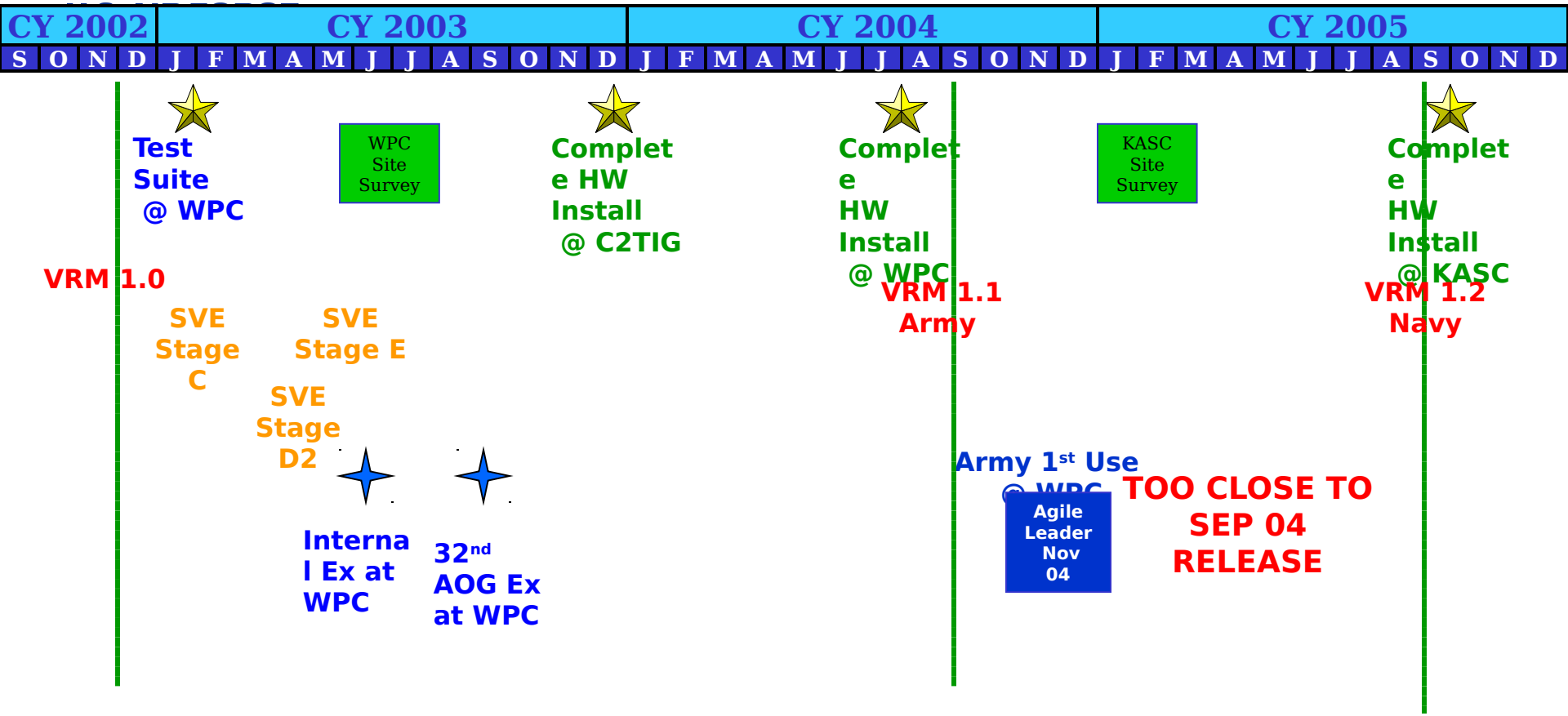
- Internal Exercises starting Spring/Summer 03
- First uses starting in 05/06
- Full title X 07 & beyond

U.S. AIR FORCE

Test & Evaluation

- Continuing unit & SWIT Testing for Federation Integration Event 5
  - Completing System Test estimated Sep/Oct 02
- Preparing Simulation validation support Jan-Jun 03
- Addressing V1.0 shortfalls with Maintenance Event (Patches)
  - Early enough to not disrupt validation
  - Example Functionality:
    - SMAT interface for TBMs
    - Intelligent Mission Controller Node (IMCN)
    - Reactive Behaviors (attack and SAM)
    - TBMCS upgrade to V1.1
- Multi-Service OT&E likely to be held at Unified Endeavor 04-2 (Sep 04)
  - May make more sense to use V1.1

Sites Beddown Schedule


CY 2002
CY 2003
CY 2004
CY 2005
S O N D J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D
Test Suite @ WPC
WPC Site Survey
Complete HW Install @ C2TIG
Complete HW Install @ WPC
KASC Site Survey
Complete HW Install @ KASC
VRM 1.0
SVE Stage C
SVE Stage E
SVE Stage D2
VRM 1.1 Army
VRM 1.2 Navy
Internal Ex at WPC
32nd AOG Ex at WPC
Army 1st Use @ WPC
Agile Leader Nov 04
TOO CLOSE TO SEP 04 RELEASE

NOTES: WPC Deployment Planning was Jul 02
C2TIG Test Suite was completed Aug 02
VRM 2.0 – Sept 06

U.S. AIR FORCE

Strategy

- Get software components out in the field as soon as possible to get user feedback and build a full capability
  - Planning to use rest of NASM and working JSIMS components to support internal exercise and AOC training (32nd AOG) in CY03
- Build on successes and prepare simulation centers for transition
  - First use in Full exercise planned in 06
- Parts of NASM can support experimentation and should be incorporated as soon as available
  - Both the Millennium and Pinnacle series of activities
- AF completes full transition after last simulation center transitions

U.S. AIR FORCE

V1.0 Functionality

- **Auto feed of ATO and ACO from TBMCS with AWSIM-TBMCS Interface**
- **Performance:**
  - **150-300 Total Fixed wing/Rotary Aircraft (RED, BLUE WHITE)**
  - **50-300 Max simultaneous FWA + RWA airborne**
- **Behaviors:**
  - **Schedule, takeoff, fly way-points, land**
  - **BINGO, WINCHESTER, React to Damage, Mission Report, React to attack, React to SAM (with Maintenance Event Releases)**

U.S. AIR FORCE

V1.0 Functionality (Continued)

- **Mission types:**
  - CAP with Role player while on station and no auto fill
  - DCA with Role player
  - Air Interdiction from ATO and Role player
  - OCA from ATO and Role player
  - CAS with Role player
  - SEAD air to ground against target, (no HARM)
  - Cruise Missile ATO tasked ALCM
  - Armed RECCE with Role Player (Objective)
  - RECCE
  - SAR
  - AWACS
  - Airlift basic aircraft behavior with role player
  - Airdrop basic aircraft behavior with role player

U.S. AIR FORCE

V1.0 Functionality (Continued)

- **FWA Engagement types**
  - Air to air
  - Missile
  - Air to surface
- **Single precision guided bomb against**
  - SNE target (e.g. BE Object)
  - WARSIM target (Equipment Group)
  - Maritime target
- **Single unguided bomb against**
  - SNE target
  - WARSIM target
- **Missile against**
  - SNE target
  - WARSIM target
  - Maritime target
- **Multiple unguided bombs a single delivery pass against (objective)**
- **Cruise Missile against**
  - SNE target
  - WARSIM target
  - Maritime target
- **Surface to air with**
  - WARSIM missile
  - Maritime missile

U.S. AIR FORCE

V1.0 Functionality (Continued)

- **Fixed wing platform categories:**
  - **Fighter (F-16, F-15)**
  - **Bomber (B-52, B-1, B-2)**
  - **CAS (F-16, A-10)**
  - **AWACS**
  - **JOINT STARS**
  - **Cargo (C-130, C-17, KC-135, KC-10, C-5, C-141)**
  - **RECCE (UAV, RC-135, U-2/TR-1)**
  - **Cruise Missile**
- **Rotary wing aircraft:**
  - **HH-60/MH-53**
- **ATO and ACO published by TBMCS and translated by NASM**
- **MISREP, TAKEOFF Report, LANDING report, AB Status report into TBMCS**
- **TADIL-A messages (track add, delete, update) to ADSI**

U.S. AIR FORCE

V2.0 Candidate Functionality

Funding Dependent

- All land identified functionality is in our critical path
  - Requires land to support automation on their side
- All maritime functionality, we are responsible for, is in our critical path
  - Majority identified is Maritime unique and their responsibility
- Majority of all requirements required by all services and joint
- The most important change is increased automation and fidelity of limited VRM 1.0 functions
  - Major cost driver, but it doesn't show as "new" functionality

(AF) – AF Specific Functionality

(A) – Identified as Land Critical Path

(N) – Identified as Maritime (and USMC) Critical Path

(J) – Identified by all services

KEY

- VRM1.0 Functionality (and V1.0.1)
- Mix of VRM1.0 and enhancements planned for VRM2.0 Functionality
- VRM2.0 Candidate Functionality

Platforms, Missions, Behaviors, and Weapons

U.S. AIR FORCE

- ✓ (J) Basic Fixed Wing Aircraft and Parametric Data Manager
  - ✓ (A) AWACS
- ✓ (J) Fixed Wing Decoy represented by FWA (if required)
- ✓ (N) RWA
- ■ (J) Satellite (DSP and GPS)
- ■ (J) Virtual Simulator
- ■ National collateral platforms/sensors

- ➢ (J) Air Intercept, Airlift, Air Refueling, Armed Recce, Electronic Attack, C2, CAS, Escort, Interdiction, HVAAP, Reconnaissance, SAR, SEAD, Surveillance, Sweep
- ✓ (A) Air To Surface, Airdrop, Air Defense Alert, CAP (fixed point), Point Defense
- ✓ (N) CAP - Moving Carrier (Station Keeping), CAP/Proceed Continuous

- ➢ (J) Flight AMP, Overrides, Creator, Orbits and enhancements, Attack Air Target, Recovery/Divert, Return to Base, Cancel Engagement (Attack), Fly Constant Heading, Package, Split Flight, React to Threat, Launch and recover diff locations
- ■ (N) Behavior update for CM Launch
- ✓ (J) Event Driven (for sim performance)
- ■ (J) Aircraft load and weapons selection
- ■ (J) Automation enhancements for targeting/land maneuver
- ■ (N) “Cracking EGs” and tgt prioritization
- ✓ (N) Deploy sonno buoys (Role Player)
- ■ (J) Higher fidelity IADS
- ■ (J) Gun
- ✓ Implicit
  - ✓ (N) AAM
  - ✓ (J) ASM (e.g. unguided bomb)
  - ✓ (J) SAM
- ■ Explicit
  - • (J) BM
  - ✓ (N) CM, CM Enhancements

Sensors, Equipment, Orgs, and Reports

U.S. AIR FORCE

- (J) Airborne Optical Sensor (Pilot's Eyes), Wing Airborne Radio Xmtr/Rcvr (Voice/Data) (implicit model), IFF, IR Sensor (including DSP)
- ✓ (N) Non Cooperative Target Recognition
- ■ (J) (J) Radar
  - ✓ Sensor
  - ✓ Detection (Clear Air)
  - • Standoff Jamming/Degradation
  - • Sensor Degradation
  - • Enhancements
  - • Sensor Degradation

- (J) Airborne Laser Designator, Chaff/Flare (in FWA Model), Comm Equipment, Comm/NAV-GPS, Comm/NAV-Airborne (implicit model), DSP Mission Payload, ECM - for aircraft, ESM (Radar Warning Receiver)
- ✓ (N) Intelligent Mission Controller Node (IMCN)—needed for automation

- (J) ABCCC, Airbase, Airbase Ground Damage Manager, AFFOR, AOC, Crude Surrogate Wing Intel, Planning Cell - Threat Avoidance / Safe Passage, Airbase/Ground Damage Manager, Threat Characteristics Data Manager, ASOC, AWACS, CRC, FAC, TACP, Weapons Director
- ✓ (AF) Space Warning Squadron
- Wing
  - (AF) Operations Squadron and updates
  - (AF) Wing Operations Center and updates
  - (AF) Maintenance Squadron and updates
  - (N) Wing Mission Planning Cell

- ✓ (N) ACO
- ✓ (J) C4I Status
- ✓ (N) GCCS COP (not a NASM req.); achieved via ADSI
- (N) MISREP
- ■ (J) DSP IR sensor message

U.S. AIR FORCE

ESI, Common Components, and Virtual Sims

- (J) C2IPS/TBMCS for Airlift & Airdrop
- (J) TADIL J Track Mgt Msgs to ADSI
- (AF) I3 Messages via TBMCS
- ✓ (J) Enable any TBMCS "Organic content" text message to be displayed on BSWS
- (N) TBMCS Force Level For JTF Strategy, Planning & Ops
- (J) TBMCS Force Level For AOC Strategy, Planning, Ops (& Airlift)
- (J) TBMCS Weather
- (N) Unit Level, Remote
- (N) TBMCS SAA & ADSI
- (J) USMTF Upgrades (needed to keep the simulation current)

- ➢ (J) CC-HLA (Tech Control)
- ➢ (J) RAT and RAT-GUI
- ✓ (J) CE
  - ✓ Aggregation
  - ✓ CCWS Interface
  - ✓ CE model
  - ✓ CE Consumer
  - ✓ Demand Queue
  - ✓ Find Route
- ✓ (J) CEDB Tool and GUIs (14 medium, 2 complex screens)

- (AF) AFSERS Family of Predator UAV, U-2, Global Hawk, and Joint STARS virtual simulators - sole virtual interface planned for VRM 2

U.S. AIR FORCE

Summary

- NASM is the flagship Air Force M&S Program
  - Battlestaff training applications being expanded to support fast setup/AOC readiness
  - NASM Civil Environment Model already used for strategic and cascading effects in exercises and experiments
- NASM SHOULD provide the glue and context for multi-echelon training & readiness interoperability
  - Higher resolution and enhanced functionality
    - Bridges battlestaff and tactical training
  - HLA based from inception
  - Discrete event simulation
- Need leadership commitment to meet JSIMS responsibilities AND meet AF needs
  - AF Title X currently taking back seat

U.S. AIR FORCE

The Road To First Use

- **Primary Objective: Define a “meaningful” AF Service First Use (SFU) exercise**
  - **C2TIG: BLUEFLAG (NAF customer won’t pay for less)**
  - **WPC: JFACC Rehearsal (e.g., Union Flash-type)?**
- **Secondary Objective: Identify candidate events that build to a meaningful SFU**
  - **C2TIG:**
    - **WINTEREX (Center internal exercise)**
    - **Pacific Warrior (Prairie Warrior follow-on for ACSC)**
    - **JAC2C (Introductory AOC course)**
  - **WPC: JFACC Rehearsal (e.g., Union Flash-type)?**

Backups

U.S. AIR FORCE

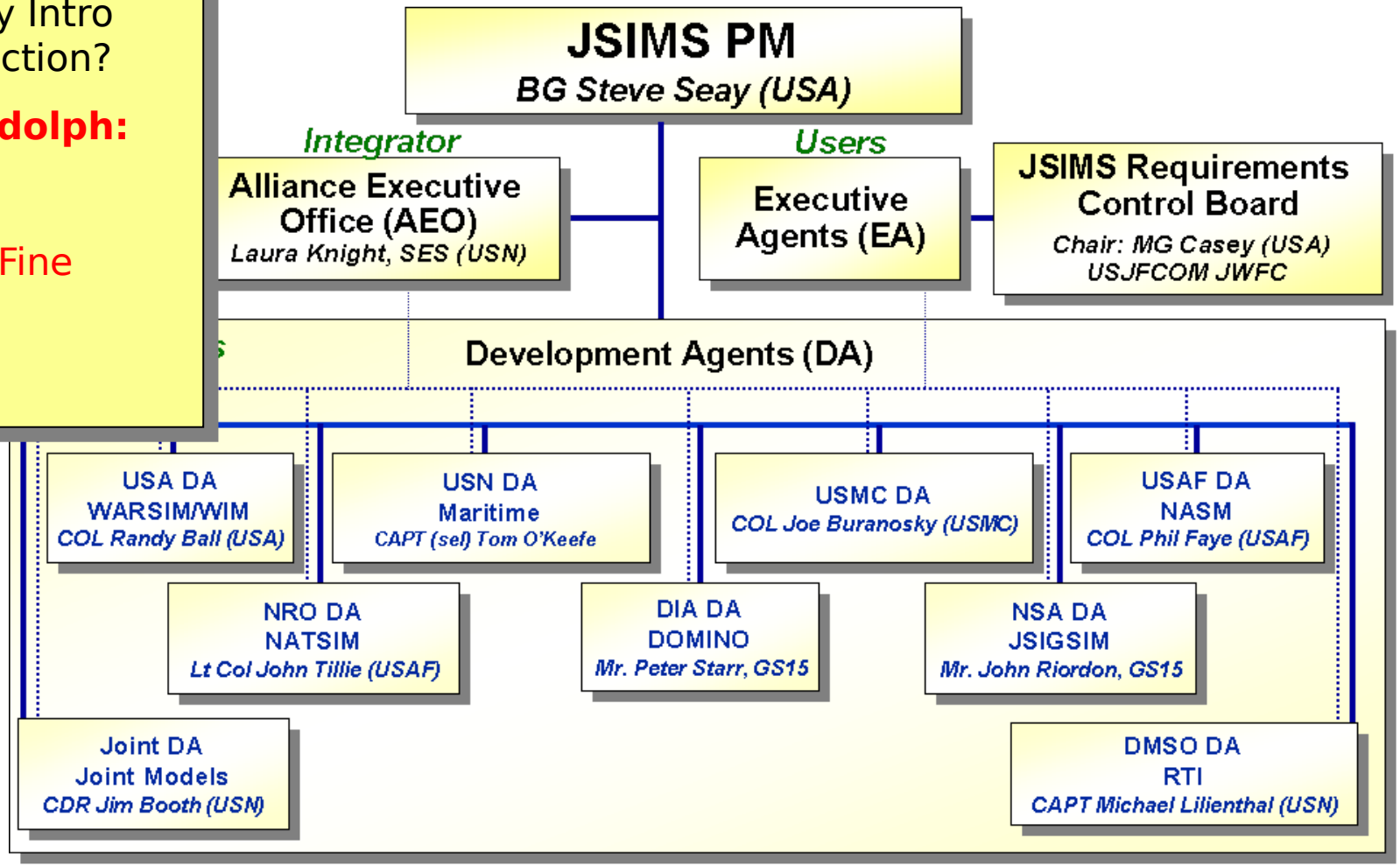
Darrell Wright:

This section should focus on NASM…move to my Intro section?

Rudolph:

Fine

JSIMS Program Management



U.S. AIR FORCE

Advantages of Transitioning

- More sophisticated architecture foundation
- Higher fidelity synthetic battlespace
- Enhanced adaptation and support features reduces site requirements and lowers costs
- System features facilitate transition to other use cases

U.S. AIR FORCE

More Sophisticated Architecture Foundation

- NASM benefits from JSIMS and its components
  - NASM architecture based on HLA standard from the start
  - Part of a unified design process (vs. combining stove pipes)
  - Provides much greater interoperability; greatly improving maintainability and reducing design conflicts between subsystems
  - Common FOM/data model does not require back doors (e.g., GDS)
    - Access to Federate/Model data is much easier and more standardized
    - Promotes easier integration with other models and systems in the future
  - Better game control, distributed data distribution/mgt & error recovery
  - Integrated HLA-based Tech Control station (COTS) providing enhanced Federation control (time mgt, …), performance monitoring, and system administration/configuration
- NASM architecture is fully object oriented (design AND code), enabling better reuse, maintainability and future enhancements

U.S. AIR FORCE

Higher Fidelity Synthetic Battlespace

- NASM model resolution is generally higher than AWSIM models, and in a # of cases, significantly higher or completely new types
  - NASM models developed based on AWSIM lessons learned
  - Typical models have 2 - 4 times the number of parametrics
  - Better behaviors; with even higher resolution models planned
    - By FY04, this will be true in almost all cases
- Discrete event execution provides more accurate representation
  - Interactions vs time cycles
  - Better interoperability with virtuals
- New model types include:
  - Civil Environment modeled -- providing cascading effects, enabling effects-based targeting
  - Automated Organizational behaviors (FY03/FY04) for more configurable & opportunistic training
  - Extensive set of Airbase components (Military Hq's, Support Facilities, Fuel Pipelines, Highway/Rail Connections,
  - Space components (Space Missions, Space Lift, Satellites (DSP, GPS), Booster, Rocket, Anti-Satellite Directed Energy, Anti-Satellite Kinetic Energy, Projectiles, SWS, …)

U.S. AIR FORCE

Enhanced Adaptation and Support Features Reduce Site Req's and Commensurate Costs

- **Unique features in NASM/JSIMS (vs. AWSIM)**
  - **Composability enables model selection at system build or dynamically**
  - **Fully automated startup within JSIMS, with data driven model library**
  - **System discovery/reconfiguration process planned**
  - **SPACECOM SMAT system integrated in, with accredited TBM and satellite models (FY02/FY03)**
- **Enhanced features**
  - **More tailorable models during Scenario Gen and Exercise Execution**
  - **Agent technology reacts to dynamic environment and supports real time rule adaptation, reducing load on Role Players**
  - **Continuous review vs. After Action Review**
- **Transition would incorporate some AWSIM features or alternatives**
  - **Access to other Legacy models to support orderly transition**
  - **With resources, e.g., Alternate Ground Game / IADS**

U.S. AIR FORCE

System Features Facilitate Transition to other Use Cases

- NASM can more readily evolve to support course of action analysis, SBA, rehearsal, doctrine development, …, due to:
  - Flexible architecture
  - FOM-based data driven design model makes the system more adaptable and extensible for future enhancements
  - Model Composability enables model selection tailored to domain requirements
  - Planned performance objectives increases level of model representation and scope of simulations
  - Agent technology supports real time rule adaptation improving automation beneficial to other domains
- Available funding focused on NASM would accelerate system enhancements and benefits to end users

Summary

- NASM is the flagship Air Force M&S Program
  - Battlestaff training applications being expanded to support fast setup AOC readiness
  - Civil environment used for Effects-Based operations and decision support application
- NASM SHOULD provide the glue and context for DMT-C2 interoperability
- Low Overhead + Accurate Portrayal = High Value
- Evolutionary on the path to JSB
  - Higher resolution and enhanced functionality
  - HLA based from inception
  - Discrete event simulation

V1.0 Functionality

- **Auto feed of ATO and ACO from TBMCS with AWSIM-TBMCS Interface**
- **Performance:**
  - **150-300 Total Fixed wing/Rotary Aircraft (RED, BLUE WHITE)**
  - **50-300 Max simultaneous FWA + RWA airborne**
- **Behaviors:**
  - **Schedule, takeoff, fly way-points, land**
  - **BINGO, WINCHESTER, React to Damage, Mission Report, React to attack, React to SAM (with Maintenance Event Releases)**

V1.0 Functionality (Continued)

- **Mission types:**
  - CAP with Role player while on station and no auto fill
  - DCA with Role player
  - Air Interdiction from ATO and Role player
  - OCA from ATO and Role player
  - CAS with Role player
  - SEAD air to ground against target, (no HARM)
  - Cruise Missile ATO tasked ALCM
  - Armed RECCE with Role Player (Objective)
  - RECCE
  - SAR
  - AWACS
  - Airlift basic aircraft behavior with role player
  - Airdrop basic aircraft behavior with role player

U.S. AIR FORCE

V1.0 Functionality (Continued)

- FWA Engagement types
  - Air to air
  - Missile
  - Air to surface
- Single precision guided bomb against
  - SNE target (e.g. BE Object)
  - WARSIM target (Equipment Group)
  - Maritime target
- Single unguided bomb against
  - SNE target
  - WARSIM target
- Missile against
  - SNE target
  - WARSIM target
  - Maritime target
- Multiple unguided bombs a single delivery pass against (objective)
- Cruise Missile against
  - SNE target
  - WARSIM target
  - Maritime target
- Surface to air with
  - WARSIM missile
  - Maritime missile

Darrell Wright:

Need to change the Rotary wing to HH-60 and MH-53

V1.0 Functionality (Continued)

- **Fixed wing platform categories:**
  - **Fighter (F-16, F-15)**
  - **Bomber (B-52, B-1, B-2)**
  - **CAS (F-16, A-10)**
  - **AWACS**
  - **JOINT STARS**
  - **Cargo (C-130, C-17, KC-135, KC-10, C-5, C-141)**
  - **RECCE (UAV, RC-135, U-2/TR-1)**
  - **Cruise Missile**
- **Rotary wing aircraft:**
  - **HH-53**
- **ATO and ACO published by TBMCS and translated by NASM**
- **MISREP, TAKEOFF Report, LANDING report, AB Status report into TBMCS**
- **TADIL-A messages (track add, delete, update) to ADSI**

U.S. AIR FORCE

V1.0 Functionality

Role Player Activities

- **CAS, FAC, TACP, ASOC**
  - **Ground commander communicates via telephone with CAS Role Player to request CAS**
  - **CAS Role player evaluates if he has any CAS missions available to service the request**
    - **Provides the Ground Commander with that information**
  - **CAS role player then populates the CCWS Attack Surface Target Screen with the target information**
    - **Selects WARSIM target Equipment Group from 2D Display**
    - **Sends flight attack interaction**
  - **If no CAS is available, CAS Role Player talks via telephone to the ASOC Role Player to notify him, so the ASOC Role Player can request additional CAS resources from the Training Audience**
  - **The ASOC Role Player then passes the Training Audience decision back to the CAS Role player who notifies the Ground Commander**
  - **For BDA, Ground Commander and the CAS Role Player will "SITREP" targeted WARSIM Eq'pt Group to see if it was damaged**

V1.0 Functionality

Role Player Activities (Continued)

- **ABCCC as ASOC**
  - **Mission aircraft will fly and orbit but the functions of the ABCCC taking on the role of the ASOC will be performed by the ASOC Role Player (RP) as described in the CAS slide**

- **AWACS, CRC, CRE, AEW, Weapons Director (SA/FA)**
  - **RP uses CCWS Intercept Tasking Screen to direct the air missions to intercept desired target aircraft**
  - **Mission Status ASTAB or the 2D Display used to see which missions are available to task**
    - **Weapons Director (WD) RP acting as the AWACS, CRE, or CRC will populate screen by selecting the flight the RP wants to control and intended target of intercept using the 2D Display**
    - **RP then selects flight to pair, shadow, or identify the target**
      - **The GUI builds and sends the attack air target interaction**
      - **Prioritization of targets (i. e. who gets attacked first) is done by the RP using information from the 2D Display**

U.S. AIR FORCE

V1.0 Functionality

Role Player Activities (Continued)

- **Escort/HVAAP**
  - Role Player (RP) uses the Create Air Mission GUI or the Update Air Mission GUI to build identical routes for the HVAA and the HVAAP missions
  - RP sets the commit criteria of the HVAAP mission to the desired radius around which the Role Player wants to defend the HVAA asset
  - HVAAP mission will then defend against hostile aircraft entering within that radius and will effectively defend the HVAA

- **Surveillance/Recon (Continuous Orbit)**
  - Continuous_Orbit logic deferred to post VRM1.0
  - RP will create the desired route in CCWS using the Create Air Mission GUI or the Update Air Mission GUI

- **GPS**
  - Role Player can modify the cep_o attribute for GPS guided weapons to simulate the decreased accuracy when there are GPS outages

V1.0 Functionality

Role Player Activities (Continued)

- **Phit Modifications (to WARSIM flat files)**
  - **Assumption is this can be accomplished using the CCWS Generic Remote Update Request GUI**
- **Comm, IO effects (disrupt or delay)**
  - **Comm modeling is VRM 2.0 requirement**
  - **Only IO functions are to turn on/off the Communications Equipment in the organizations to simulate damage to the communications systems**
    - **Can be done with CCWS Magic Move GUI**
- **Automated Sweep**
  - **Mission Planning Cell will not automatically plan sweep missions**
    - **Role Player can plan them using the Create Air Mission or Update Air Mission GUIs**

U.S. AIR FORCE

V1.0 Functionality

Role Player Activities (Continued)

- **RWA – SAR**
  - Accomplished by telephone interactions with the training audience
  - RWA can fly to the "crash point"
    - No WARSIM instantiated aircrew to pick up—same as AWSIM today
    - Role Player (RP) can determine whether the pick-up was successful or not
- **RP updates AMP**
  - RP can create and update/change any air mission as part of basic CCWS functionality
- **Check for appropriate loads from stores IAW squadron standard loads**
  - Weapon loads for missions can be seen by reviewing the Air Mission Plan in the Update Air Mission GUI
  - Available weapons are constrained to what is currently available at the base and this information is available in the GUI
  - Default load is defined during scenario generation for each squadron to be used when a tasking in the ATO does not specify weapons

U.S. AIR FORCE

V1.0 Functionality

Role Player Activities (Continued)

- **Intelligent Mission Controller Node (IMCN)**
  - Included in Jan 03 Maintenance Event Release
  - Role Player (RP) can perform the threat avoidance task by modifying the air mission plan with the Update Air Mission GUI to specify a route around known threats

- **Package**
  - Package planning done so missions all fly same route at the designated time
  - RP makes decisions concerning defense of the package
    - Uses CCWS intercept GUI to attack air targets
  - Missions will not fly in any formation relative to each other
    - Same as AWSIM
  - RP can cancel missions if a critical mission doesn't fly and package should be cancelled

U.S. AIR FORCE

V1.0 Functionality

Role Player Activities (Continued)

- **Airbase Functionality/Behavior**
  - **Limited to Runways and Taxiways**
    - **Shelters and buildings not in V1.0**
  - **Role Player can lengthen maintenance times**
    - **Modify the aircraft attributes for MTTR and ICT Time**
    - **Effect would be for all aircraft of that type and would not be specific to that base**

- **Airlift, Airdrop**
  - **RP must track airlift and airdrop loads manually and notify the controlling RP when mission arrives at drop-off point for their cargo**
  - **Controlling RP magic moves objects to correct location**
  - **For airlift of NASM supply items from base to base, RP will have to perform two magic moves**
    - **Delete whatever was loaded**
    - **Magic resupply the unit receiving the supplies via CCWS**

U.S. AIR FORCE

V2.0 Candidate Functionality

Funding Dependent

- All land identified functionality is in our critical path
  - Requires land to support automation on their side
- All maritime functionality, we are responsible for, is in our critical path
  - Majority identified is Maritime unique and their responsibility
- Majority of all requirements required by all services and joint
- The most important change is increased automation and fidelity of limited VRM 1.0 functions
  - Major cost driver, but it doesn't show as "new" functionality

(AF) – AF Specific Functionality

(A) – Identified as Land Critical Path

(N) – Identified as Maritime (and USMC) Critical Path

(J) – Identified by all services

KEY

- VRM1.0 Functionality (and V1.0.1)
- Mix of VRM1.0 and enhancements planned for VRM2.0 Functionality
- VRM2.0 Candidate Functionality

Platforms, Missions, Behaviors, and Weapons

U.S. AIR FORCE

- ✓ (J) Basic Fixed Wing Aircraft and Parametric Data Manager
  - ✓ (A) AWACS
- ✓ (J) Fixed Wing Decoy represented by FWA (if required)
- ✓ (N) RWA
- ■ (J) Satellite (DSP and GPS)
- ■ (J) Virtual Simulator
- ■ National collateral platforms/sensors

- ➢ (J) Air Intercept, Airlift, Air Refueling, Armed Recce, Electronic Attack, C2, CAS, Escort, Interdiction, HVAAP, Reconnaissance, SAR, SEAD, Surveillance, Sweep
- ✓ (A) Air To Surface, Airdrop, Air Defense Alert, CAP (fixed point), Point Defense
- ✓ (N) CAP - Moving Carrier (Station Keeping), CAP/Proceed Continuous

- ➢ (J) Flight AMP, Overrides, Creator, Orbits and enhancements, Attack Air Target, Recovery/Divert, Return to Base, Cancel Engagement (Attack), Fly Constant Heading, Package, Split Flight, React to Threat, Launch and recover diff locations
- ■ (N) Behavior update for CM Launch
- ✓ (J) Event Driven (for sim performance)
- ■ (J) Aircraft load and weapons selection
- ■ (J) Automation enhancements for targeting/land maneuver
- ■ (N) “Cracking EGs” and tgt prioritization
- ✓ (N) Deploy sonno buoys (Role Player)
- ■ (J) Higher fidelity IADS
- ■ (J) Gun
- ✓ Implicit
  - ✓ (N) AAM
  - ✓ (J) ASM (e.g. unguided bomb)
  - ✓ (J) SAM
- ■ Explicit
  - • (J) BM
  - ✓ (N) CM, CM Enhancements

Sensors, Equipment, Orgs, and Reports

U.S. AIR FORCE

- (J) Airborne Optical Sensor (Pilot's Eyes), Wing Airborne Radio Xmtr/Rcvr (Voice/Data) (implicit model), IFF, IR Sensor (including DSP)
- ✓ (N) Non Cooperative Target Recognition
- ■ (J) (J) Radar
  - ✓ Sensor
  - ✓ Detection (Clear Air)
  - • Standoff Jamming/Degradation
  - • Sensor Degradation
  - • Enhancements
  - • Sensor Degradation

- (J) Airborne Laser Designator, Chaff/Flare (in FWA Model), Comm Equipment, Comm/NAV-GPS, Comm/NAV-Airborne (implicit model), DSP Mission Payload, ECM - for aircraft, ESM (Radar Warning Receiver)
- ✓ (N) Intelligent Mission Controller Node (IMCN)—needed for automation

- (J) ABCCC, Airbase, Airbase Ground Damage Manager, AFFOR, AOC, Crude Surrogate Wing Intel, Planning Cell - Threat Avoidance / Safe Passage, Airbase/Ground Damage Manager, Threat Characteristics Data Manager, ASOC, AWACS, CRC, FAC, TACP, Weapons Director
- ✓ (AF) Space Warning Squadron
- Wing
  - (AF) Operations Squadron and updates
  - (AF) Wing Operations Center and updates
  - (AF) Maintenance Squadron and updates
  - (N) Wing Mission Planning Cell

- ✓ (N) ACO
- ✓ (J) C4I Status
- ✓ (N) GCCS COP (not a NASM req.); achieved via ADSI
- (N) MISREP
- ■ (J) DSP IR sensor message

U.S. AIR FORCE

ESI, Common Components, and Virtual Sims

- (J) C2IPS/TBMCS for Airlift & Airdrop
- (J) TADIL J Track Mgt Msgs to ADSI
- (AF) I3 Messages via TBMCS
- ✓ (J) Enable any TBMCS "Organic content" text message to be displayed on BSWS
- (N) TBMCS Force Level For JTF Strategy, Planning & Ops
- (J) TBMCS Force Level For AOC Strategy, Planning, Ops (& Airlift)
- (J) TBMCS Weather
- (N) Unit Level, Remote
- (N) TBMCS SAA & ADSI
- (J) USMTF Upgrades (needed to keep the simulation current)

- ➢ (J) CC-HLA (Tech Control)
- ➢ (J) RAT and RAT-GUI
- ✓ (J) CE
  - ✓ Aggregation
  - ✓ CCWS Interface
  - ✓ CE model
  - ✓ CE Consumer
  - ✓ Demand Queue
  - ✓ Find Route
- ✓ (J) CEDB Tool and GUIs (14 medium, 2 complex screens)

- (AF) AFSERS Family of Predator UAV, U-2, Global Hawk, and Joint STARS virtual simulators - sole virtual interface planned for VRM 2

U.S. AIR FORCE

V1.0 Functionality (Continued)

- **Full System Test**
  - 75 Blue sorties over six hours via ATO
  - Database of 181 aircraft
  - 70 Blue fixed wing, ground-based aircraft
  - Blue carrier wing of 32 aircraft
  - 12 Blue rotary wing
  - 14 Blue ground-based and Navy UAVs
  - 48 OPFOR aircraft
  - 5 civilian aircraft
  - ATO launches Blue missions thru TBMCS
  - No more than 30 aircraft airborne at any one time
  - No more than 100 simultaneous tracks
  - Some missions will be airborne throughout the period (JSTARS, e.g.)
  - Role players will launch the Red and civilian aircraft

U.S. AIR FORCE

Sim Interface Reqs

- JSIMS VRM 2.0 (a.k.a., AF Title X (AF Title X))
  - AFSERS (which is a family of Predator UAV, U-2, Global Hawk, and Joint STARS virtual simulators)
  - TPS-75 (modeled by JOISIM)
- JSIMS VRM 3.0
  - Rivet Joint
  - MCE
  - Cobra Ball (modeled by JOISIM)
  - Cobra Judy (modeled by JOISIM)
  - Patriot (modeled by NASM)
  - Airborne Laser (modeled by NASM)
- JSIMS VRM 4.0
  - F-15C
  - F-16C
  - A-10
  - MC-130H
  - AC-130U

Virtual Sims: Potential for impact to VRM3 and beyond based on impacts to Sep 04 VRM2.0

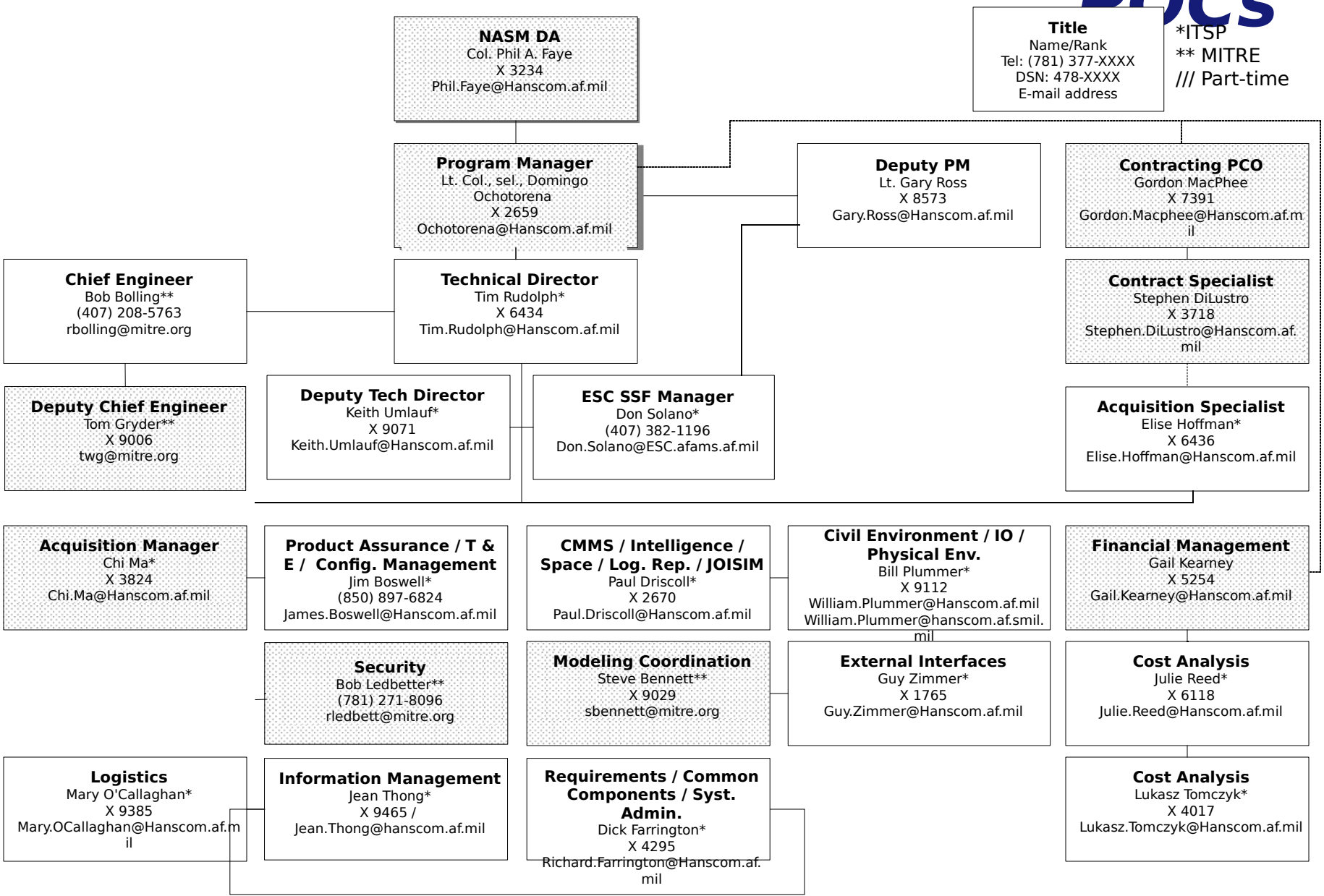
All Sim Assets must be HLA compliant. Hopefully tactical sims will be via a consistent DMT interface standard.

U.S. AIR FORCE

NASM is Dependent on JSIMS Partners

- Electronic Combat (EC)/IADS fidelity
- No Identification Friend or Foe (IFF) play for air to represent air or surface to air fratricide
- Ground Game (WARSIM) too large in terms of support personnel and computing footprint
- Correlation of terrain and ground objects for visualization and precision target effects
- Impacts of upper enclave (SCI) architecture on equipment & facilities of training centers for small subset of functionality
- Civil Environment & Effects-based Operations
  - Alliance postponing commitment to fund
  - Land is not supporting consumption to allow AF developed CE to work

NASM Organization & POCs



Land V2.0 XDA Requirements Summary

U.S. AIR FORCE

- **Land perceived V1.0 Gaps**
  - **Explicit TBMs (Patriot missile fly-out)**
  - **Automated Airlift/Airdrop**
  - **Automated TACP—needs clarification**
  - **Some inputs received <u>not</u> AF requirements (e.g. Launch UAVs w/out an airbase)**
- **Functionality not tested (implied as potential gaps)**
  - **Sensing from NASM to Land; Sensing from Land to NASM (ADA)**
  - **Direct fire effects from Land to NASM(ADA)**
  - **Direct fire from NASM to Land (unit and SNE damage**
  - **Indirect fire from NASM to Land (unit and SNE damage)**
  - **Electronic Warfare (EW)/Standoff Jamming**
  - **Manual TACP**
  - **MTP and Army owned A&S platforms**
- **Functionality required for large Army exercise**
  - **SEAD, Reconnaissance, and Surveillance Missions**
  - **Aircraft/Ground Damage**
  - **AWACS**
  - **Unguided Bomb**
  - **Integrated Air Defense**
  - **Aircraft load and weapons selection capability**
  - **Chaff/Flares not explicitly or implicitly modeled**

U.S. AIR FORCE

Maritime V2.0 XDA Requirements Summary

- 170 Requirements sent as input
  - 45-60 are not A&S requirements
  - For the remainder, responded with functionality A&S is providing (partial A&S requirements)
    - Need feedback to see if there are any gaps
    - Interpretation of Naval language—potential for misunderstanding
- Concerns with C4I expectations
  - ATO, TBMCS interface, RTI interface, MISREP
    - Follow-up meeting revealed more Maritime development is required to use the A&S functionality provided

U.S. AIR FORCE

ESI (1 of 2)

- VRM 1
  - Start TBMCS SAA & ADSI
    - TADIL A air picture
  - TBMCS Force Level For JTF Strategy, Planning & Ops
    - USMTF Messages & Database Transfers
    - USMTF 2000 (and backward compatibility with USMTF 1998)
  - Intelligent Mission Controller Node (IMCN) (Patch at 1.0.1)
  - Human readable ATO text being made available to RPs
- AFSERS is sole virtual interface planned for VRM 2
  - Family of Predator UAV, U-2, Global Hawk, and Joint STARS virtual simulators

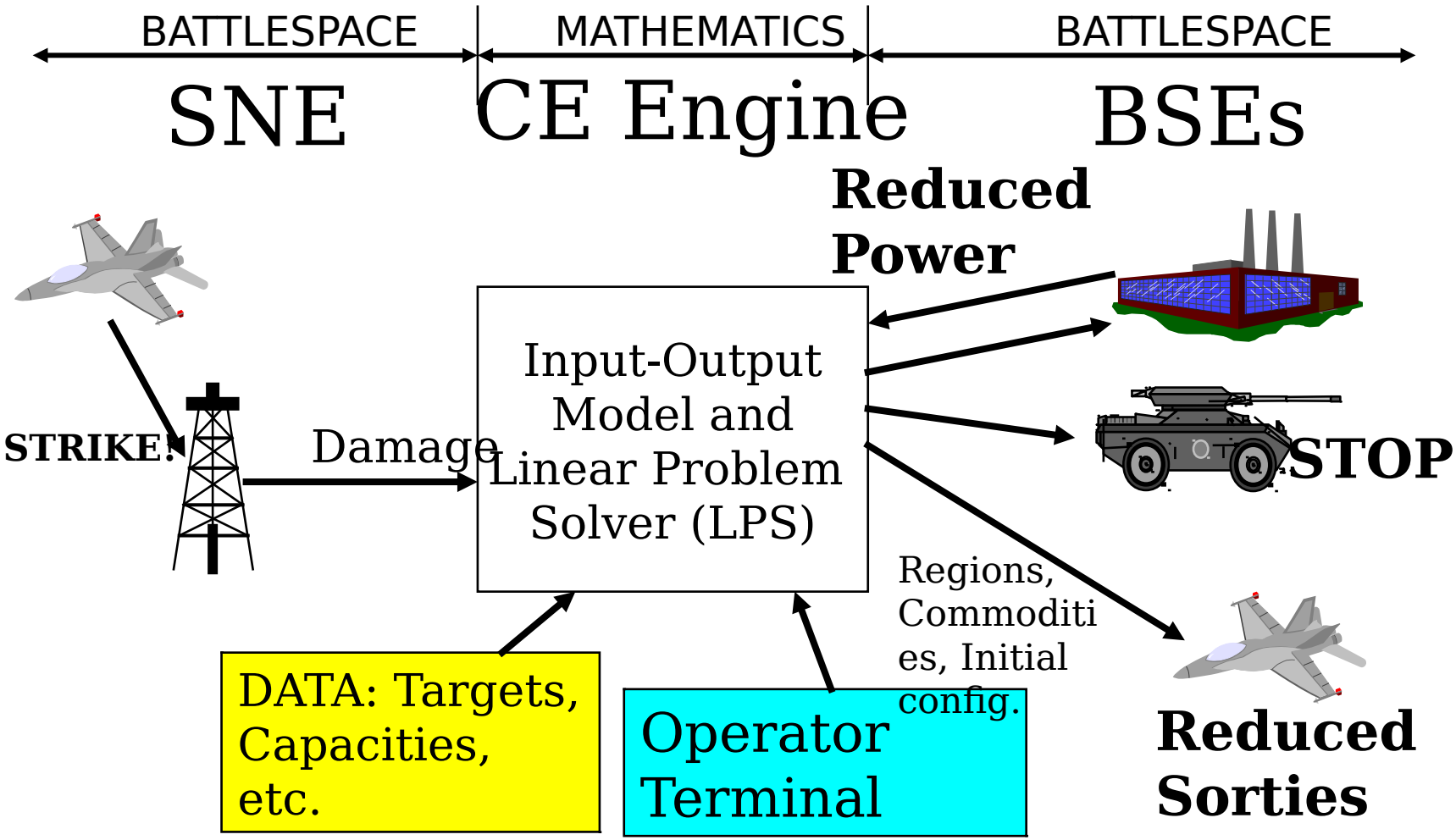
U.S. AIR FORCE

ESI (2 of 2)

- VRM 2
  - TBMCS Force Level For AOC Strategy, Planning, & Ops
  - C2IPS
    - Air Lift Advisory (ALADV), Air Lift Arrival (ALARR), Air Lift Departure (ALDEP), & Air Lift Schedule (ALSCD)
    - May leverage off TRANSCOM Federate
  - Completion of TBMCS SAA & ADSI
    - TADIL A & J AF subsets
  - Textual Weather data (forecasts, advisories)
    - Shown on BSWS to support Role Player actions; do not directly influence model behaviors (Partial)
  - JSWS Interface (via WIM at 1.0 & AFSERS at 2.0)
    - MTI
    - SAR
  - Update IMCN
  - I3 Messages via TBMCS
    - Need Intel DAs to provide IIR, RECCEXREP, BDAREP, & INTREP
  - USMTF 2002 (Downward Compatible to 1998 & 2000)

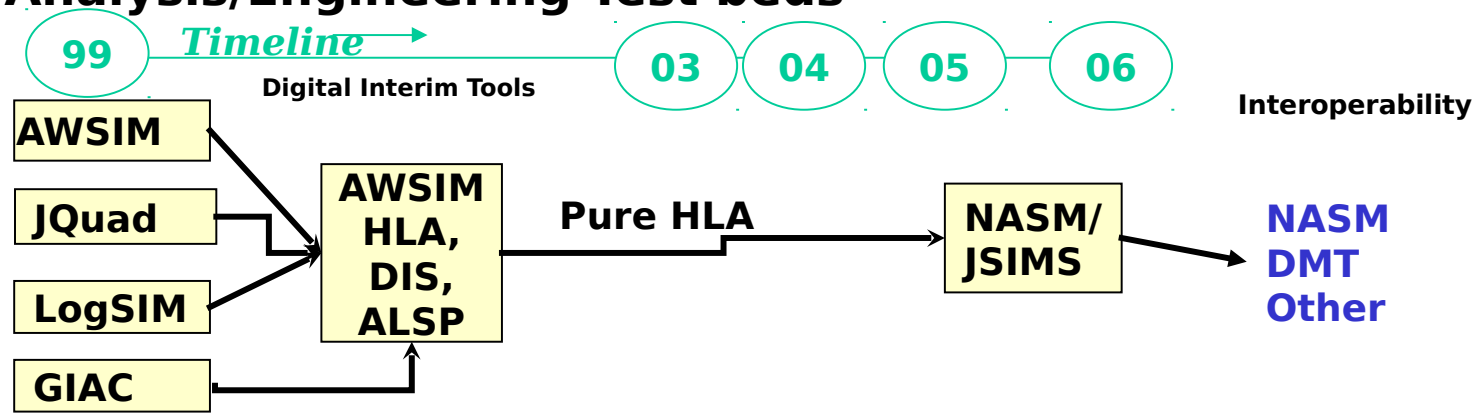
Civil Environment Model

U.S. AIR FORCE



Importance to Transition

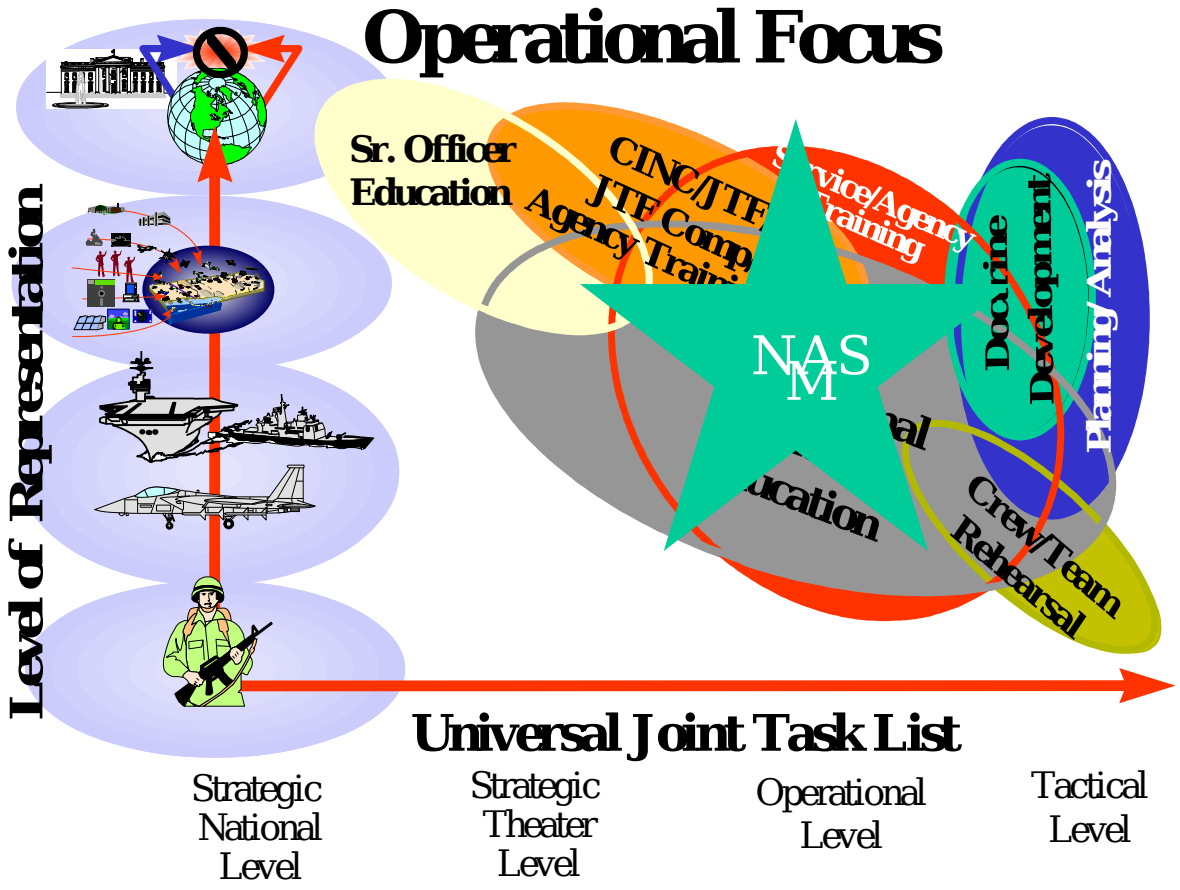
- NASM will meet requirements for operational readiness training to support the twenty-first century warfighter's preparation for real world contingencies
  - Increased realism through accurate portrayal
  - Increased span/scope of aerospace missions/systems
  - Increased accuracy of performance data and results
- New use cases & leveraging of new AWSIM directions
  - Positioned to support ops rehearsal, Course of Action Analysis/Engineering Test beds



U.S. AIR FORCE

JSIMS Types of Training Supported

- Accelerating JSIMS to meet AOC Opportunistic Training
- Requires AWSIM in the near term
- Builds upon early JSB activities
- Robust portrayal of the battlespace



* Note: Requirement to support Doctrine Development and Planning/Analysis use cases is inherent in both CINC/JTF/ Component/Agency Training and Service/Agency Training use cases.

U.S. AIR FORCE

UFRs & POM Plus Ups Address

- Meeting AF commitments to JSIMS partners
- Impacts to development schedule and JSIMS direction changes
  - New architectures and rework from other partner changes
  - Extended integration and test requirements
- Known historical gaps in the current AF baseline (e.g., simulators)
- Addressing (minimally) shortfalls to AF Title X training, for example
  - Electronic Combat (EC)/IADS fidelity
  - Ground Game (WARSIM) too large in terms of support personnel and computing footprint
  - Impacts of upper enclave (SCI) architecture on equipment & facilities of training centers for small subset of functionality
  - Civil Environment & Effects-based Operations

U.S. AIR FORCE

Without UFRs/POM

- NASM/JSIMS represents the future of automated battlestaff exercises supporting a key area of Air Force readiness.
- Not planning to upgrade to NASM/JSIMS will
  - not support accurate portrayal of aerospace power in joint and service exercises and by not fully supporting the full range of AF operations
  - will produce negative training within the AF.
- Without additional funding in the POM, NASM would be unable to
  - transition from the AFMSTT causing a cascading operations & maintenance funding impact
  - meet currently planned future capabilities
  - nor to continue a steady state spiral development in the JSIMS block strategy schedule.
- NASM will be unable to provide the simulation centers with the required equipment to support exercises.

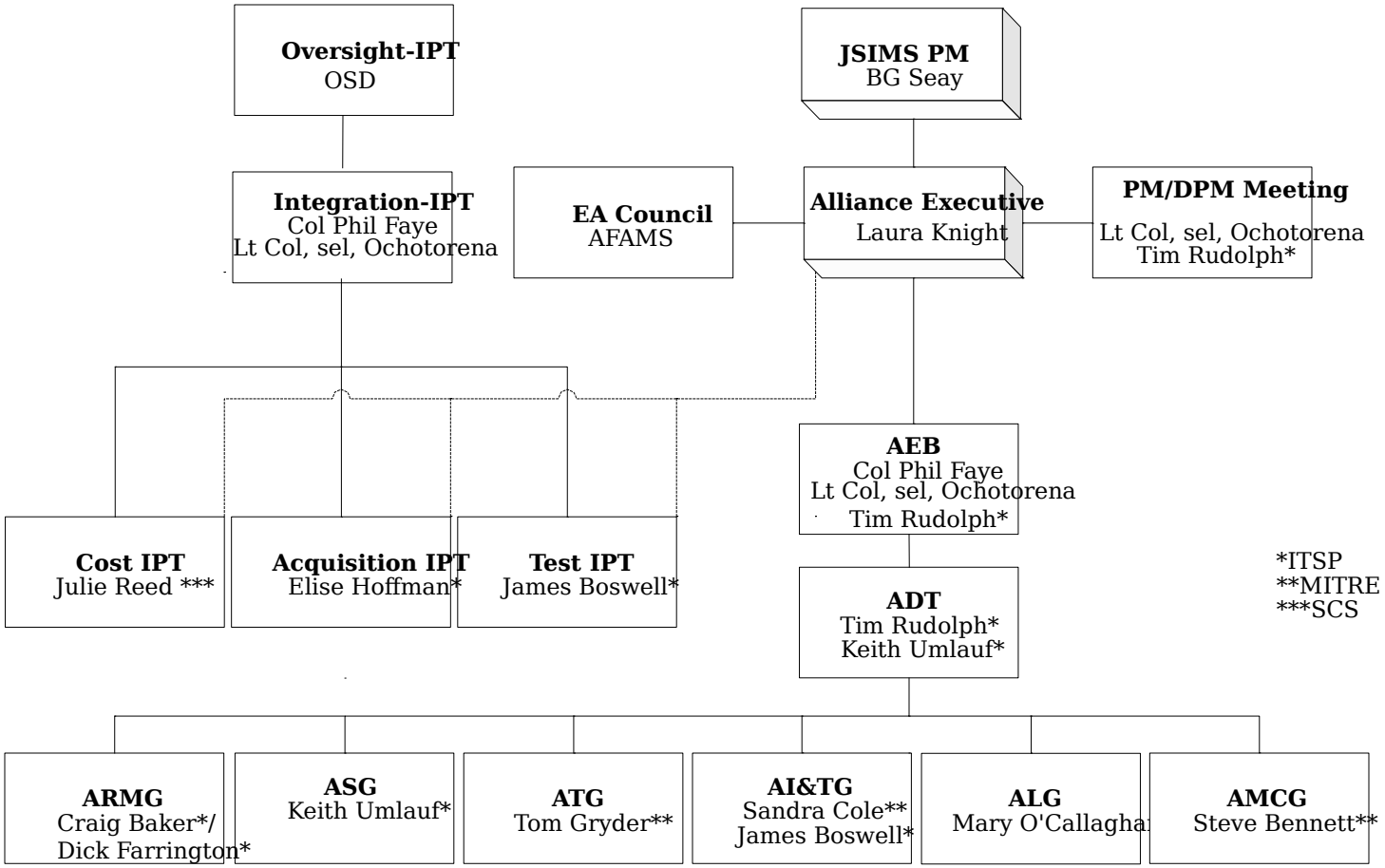
U.S. AIR FORCE

Current AF Baseline

- There have been impacts to development schedule and resources as a member of the Alliance
  - New architectures and rework from other partner changes
  - Organization changes
- Known historical gaps in the current AF baseline
  - Intentionally postponed to be addressed with outyear funding. For example, virtual simulator interfaces
- Current extrapolation of available funding to meet requirements for JSIMS Ver 2 between FY07 & 08
  - Maybe later based on unanticipated impacts
  - Not executable given current AFMSTT planning (moving from mid 04 to mid 05)

U.S. AIR FORCE

JSIMS Organization & POCs



- **Supporting all aspects of Alliance organization**
- **AFAMS is our day to day user and EA representation**

U.S. AIR FORCE

NASM Program Requirements

- **Requirements Documents**
  - **Mission Need Statement: HQ USAF 009-93 NASM MNS, 8 Aug 1994**
  - **Program Management Document: PMD 2375(2)/5 Oct 2001**
  - **NASM Operational Requirements Document: HQ USAF 009-93-1 (Rev1) NASM ORD Version 1.1, 15 Apr 1998, Revision In Coordination**
- **Air Force simulation centers to use of JSIMS/NASM**
  - **C2 Technology Innovation Group (C2TIG), Hurlburt, Florida**
  - **Warrior Preparation Center (WPC), Einsiedlerhof, Germany**
  - **Korean Air Simulation Center (KASC), Osan AB, Republic of Korea**